

What is claimed is:

1. A data output apparatus for writing on a recording medium a data stream to be inputted and reading and sending out said data stream recorded on said recording medium to external device,

said data stream containing video-audio information compressed at a variable bit rate,

said data output apparatus comprising:

a first buffer for holding said inputted data stream;

writing means for writing on said recording medium said data stream held in said first buffer;

a second buffer for holding said data stream to be outputted to external device;

reading means for reading onto said second buffer said data stream held on said recording medium;

predicting means for predicting duration W to consume said data stream held on said the second buffer on the basis of the duration required for presentation of the video-audio information contained in said data stream held on said second buffer; and

control means for controlling said writing means and said reading means,

said writing means and said reading means writing or reading said data stream exclusively on said recording medium, and

said control means controlling said writing means and said reading means on the basis of the predicted duration W to consume said data stream to prevent said second buffer from underflow.

2. The data output apparatus as defined in claim 1 wherein said

control means further controls said writing means and said reading means in such a way as to curb the number of switchings between the writing and reading of said data stream on said recording medium.

5 3. The data output apparatus as defined in claim 1 wherein,

 with the maximum duration required for writing a specific size of segment of said data stream as the first maximum duration T_w and the maximum duration required for reading on said second buffer a specific size of segment of said data stream recorded on said recording medium as the
10 second maximum duration T_r and

 with a value larger than said second maximum duration T_r as the first threshold value T_1 and a value larger than the value obtained by adding said first maximum duration T_w with said second maximum duration T_r as the second threshold value T_2 ,

15 said control means controls said writing means and said reading means in such a way that in case said predicted consumption duration W obtained by said predicting means is not less than the second threshold value T_2 , a permit will be given for writing said data stream from the first buffer to said recording medium.

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 4. The data output apparatus as defined in claim 3 wherein said control means controls said writing means and said reading means in such a way that in case said predicted consumption duration W obtained by predicting means is less than the second threshold value T_2 , the writing of
25 said data stream from the first buffer to said recording medium is prohibited, and a permit is given for reading said data stream from said recording medium onto the second buffer.

5. The data output apparatus as defined in claim 1 wherein there is provided a memory holding a duration table where the offset values b_{01} , b_{02} ,, b_{0n} of said data stream are linked to the times a_{01} , a_{02} ,, a_{0n} for said data stream of said offset values b_{01} , b_{02} ,, b_{0n} each to be reproduced,

said predicting means:

measuring the amount of data sent out from said second buffer and the amount of data inputted in the second buffer,

working out the top offset value b_{0i} and the last offset value b_{0j} of said data stream held in the second buffer on the basis of said amount of data sent out and the amount of data inputted, and

acquiring the time a_{0i} corresponding to the offset value b_{0i} and the time a_{0j} corresponding to the offset value b_{0j} ,

thereby working out said second predicted consumption duration $a_{0j} - a_{0i}$.

6. The data output apparatus as defined in claim 1 wherein there is provided a memory having a time table on which the durations " $a_{11} - 0$," " $a_{12} - a_{11}$," " $a_{13} - a_{12}$," ... " $a_{1n} - a_{1(n-1)}$ " are linked to the bit rates r_{11} , r_{12} , r_{13} ..., r_{1n} of the data stream at the respective durations,

said predicting means:

measuring the amount of data sent out from said second buffer and the amount of data inputted in the second buffer, and

working out the top offset value a_{1i} and the last offset value a_{1j} of said data stream held in the second buffer on the basis of said amount of data sent out and the amount of data inputted,

thereby working out said predicted consumption duration $a_{1j} - a_{1i}$.

7. The data output apparatus as defined in claim 1 wherein said data stream is a data stream of the MPEG formula and wherein said predicting means:

5 acquires the time code value utilized for reproduction that is contained in the data stream of the MPEG formula held in said second buffer, and

predicts the duration W to consume said data stream held in the second buffer on the basis of said time code.

10 8. The data output apparatus as defined in claim 7 wherein said time code is a system clock reference in the pack header provided at the head of each pack forming the program stream of the MPEG formula.

15 9. The data output apparatus as defined in claim 7 wherein said time code is a system clock reference in the adaptation field at each transport packet forming a transport stream of the MPEG formula.

20 10. The data output apparatus as defined in claim 1 wherein said data stream is a data stream in which bit rate information at the duration of reproduction in blocks is recorded in the information field provided at the head in the respective blocks of said data stream, and wherein said predicting means:

acquires from said information field bit rate information at the time of reproduction in blocks of the data stream held in the second buffer,

25 acquires the size of each block, and

predicts the duration W to consume said data stream held in the second buffer on the basis of said information on bit rate and said block size.

11. The data output apparatus as defined in claim 7 or 10 wherein there is additionally provided send rate detection means for detection of the amount of data per unit period to be sent out from the second buffer, and
5 said predicting means:

predicts the duration W to consume said data stream held in the second buffer on the basis of the history of the amounts of data per unit period sent out from the second buffer, the above amounts of data detected by said send rate detection means, and the history of the durations required
10 for presentation of video-audio information contained in said data stream held in the second buffer.